CSC 4356	Interactive Computer Graphics

Credit Hours: 3
Time: 10:30 – 11:50am Tuesday & Thursday
Location: 218 Tureaud Hall

Instructor: Jinwei Ye (jinweiye@lsu.edu)
TA: Sirazum Tisha (stisha1@lsu.edu)

Texts and Other Supplemental Materials:
Textbooks:
"Computer Graphics with OpenGL", 4th Edition, Warren Carithers, M. Pauline Baker, Donald D. Hearn, Pearson, ISBN-13: 978-0136053583
"OpenGL Programming Guide", The Khronos OpenGL ARB Working Group, Addison-Wesley
Lecture notes and supplemental materials available on the course website, with links to resources around the web.

Catalog Course Description:
Analytical treatment of graphics using the digital computer; graphical display and input devices; computer graphics systems and standards; two- and three-dimensional transformations; viewing transformation; geometric modeling; visibility determination; illumination models and surface properties; interactive techniques; ray tracing; texture mapping and antialiasing; realism in 3D graphics; future trends.

Prerequisites:
Experience in mathematics and computer programming.

Applied to the Degree:
All concentrations – Selected CSC Elective CSC 3000-level and above
All concentrations – Selected elective: "Tech Electives"
All concentrations except CS and Second Discipline – Approved free elective
Software Engineering – Selected Elective for area concentration

Learning Objectives:
1. Derive a geometric definition of given 3D object.
2. Use OpenGL to create a rendering window and receive user input.
3. Diagram the 3D graphics pipeline.
4. Compose matrix operations to arrange 3D scenes.
5. Demonstrate the 3D viewing projection in matrix operations.
6. Implement an interactive 3D visualization with immediate response to user input.
7. Demonstrate the data structure and algorithm for eliminating hidden surfaces.
8. Implement the standard model of 3D illumination.
9. Demonstrate the difference between point and directional light sources.
10. Demonstrate the difference between per-vertex and per-fragment illumination.
11. Describe methods for modeling and measuring the surface material property.

12. Implement basic ray-tracing algorithm.
13. Process and utilize 3D models and images in standard formats.
14. Describe the role of the CPU and GPU, and how each manages data.

Major Topics:

1. Introduction and the History of Computer Graphics
2. 2D & 3D Geometric Transformation
3. Viewport Transformation
4. Projection Transformation
5. OpenGL Introduction
6. Rasterization
7. 3D Rendering Pipeline
8. Hidden Surface Elimination
9. Illumination and Shading
10. Global Illumination
11. Texture Mapping
12. GPU Programming and Shading Language

Grading:

- Warm-up math problem set: 5%
- Four programming assignments: 4 x 15% = 60%
- Midterm Exam (October 12): 15%
- Final Exam: 20%
- Extra credit (course participation & evaluation): 2%

Final course grade scale:

A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
≥100	≥94	≥90	≥87	≥83	≥80	≥77	≥73	≥70	≥67	≥63	≥60	<60

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